REMARKS

This Request for Continued Examination is in response to the Final Office Action dated October 16, 2007, having a shortened statutory period for response set to expire on January 16, 2008. Please reconsider the claims pending in the application for reasons discussed below.

In the specification, the paragraph [0001], has been amended to recite the patent number of a previously cited application.

Claims 1-2, 4-7, 9-14, 16-17, 19-20, 22-25, 27-28, 30-33, 35-38, 40-42, 44-46, 48-51, and 53-67 remain pending in the application upon entry of this Request. Claims 3, 8, 15, 21, 26, 29, 34, 39, 43, 47, and 52 have been cancelled without prejudice and claims 56-67 have been added by the Applicant. Claims 1-2, 4-7, 9-14, 16-17, 19-20, 22-25, 27-28, 30-33, 35-38, 40-42, 44-46, 48-51, and 53-55 stand rejected by the Examiner. Reconsideration of the rejected claims is requested for reasons below.

Claims 1-2, 4-7, 9-14, 16-17, 19-20, 22-25, 27-28, 30-33, 35-38, 40-42, 44-46, 48-51, and 53-55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Aaltonen et al.*, U.S. Pub. No. 2003/0165615, herein *Aaltonen*, in view of *Kawano et al.*, U.S. Pat. No. 6605735, herein *Kawano*. The Examiner asserts it would have been obvious to modify *Aaltonen* to include the precursors of *Kawano* in order to use a precursor that gives the benefit of low temperature deposition and ease of supply. The Examiner further asserts it would have been obvious to use CVD processes in an ALD process. The Applicant respectfully traverses the rejection in view of the amended claims.

Aaltonen and *Kawano* both teach using oxidizers to form ruthenium films during vapor deposition processes, while *Aaltonen* discloses an ALD process and *Kawano* discloses a CVD process.

Aaltonen and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a substrate surface, comprising positioning a substrate within a process chamber, exposing a ruthenium-containing compound to the substrate while forming a ruthenium-containing compound film thereon, wherein the ruthenium-containing compound is selected from the group consisting of bis(dialkylpentadienyl) ruthenium compounds, bis(alkylpentadienyl) ruthenium

compounds, bis(pentadienyl) ruthenium compounds, and combinations thereof, purging the process chamber with a purge gas, exposing a reducing gas comprising ammonia and atomic hydrogen to the ruthenium-containing compound film on the substrate while forming a ruthenium layer thereon, and purging the process chamber with the purge gas, as recited in claim 1, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a substrate surface within a process chamber, sequentially comprising exposing a substrate to bis(2,4-dimethylpentadienyl) ruthenium to form a ruthenium-containing film on the substrate, purging the process chamber with a purge gas, exposing a reducing gas comprising ammonia to the ruthenium-containing film while forming a ruthenium layer thereon, and purging the process chamber with the purge gas, as recited in claim 11, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a substrate, comprising depositing a barrier layer on a substrate during a first ALD process, wherein the barrier layer comprises a material selected from the group consisting of tantalum, tantalum nitride, tantalum silicon nitride, titanium, titanium nitride, titanium silicon nitride, tungsten, tungsten nitride, and combinations thereof, and exposing the substrate sequentially to a ruthenium-containing compound and a reducing gas comprising ammonia to form a ruthenium layer on the barrier layer during a second ALD process, wherein the ruthenium-containing compound is selected from the group consisting of bis(dialkylpentadienyl) ruthenium compounds, bis(alkylpentadienyl) ruthenium compounds, bis(pentadienyl) ruthenium compounds, and combinations thereof, as recited in claim 19, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium film on a dielectric material disposed on a substrate surface, comprising positioning a substrate comprising a dielectric layer thereon within a process chamber, exposing a ruthenium-containing compound to the dielectric layer while forming a ruthenium-containing compound film thereon, wherein the ruthenium-containing compound is selected from the group consisting of

bis(dialkylpentadienyl) ruthenium compounds, bis(alkylpentadienyl) ruthenium compounds, bis(pentadienyl) ruthenium compounds, and combinations thereof, purging the process chamber with a purge gas, exposing a reducing gas comprising ammonia to the ruthenium-containing compound film on the dielectric layer while forming a ruthenium layer thereon, and purging the process chamber with the purge gas, as recited in claim 27, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a substrate surface, comprising positioning a substrate within a process chamber, exposing the substrate to a ruthenium-containing compound comprising ruthenium and at least one open chain dienyl ligand while forming a ruthenium-containing compound film thereon, purging the process chamber with a purge gas, exposing the ruthenium-containing compound film to a reducing gas comprising ammonia and hydrogen gas while forming a ruthenium layer on the substrate, and purging the process chamber with the purge gas, as recited in claim 36, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a low-k material disposed on a substrate surface, comprising positioning a substrate comprising a low-k layer disposed thereon within a process chamber, heating the substrate to a temperature within a range from about 200°C to about 400°C, exposing the low-k layer to a ruthenium-containing compound comprising ruthenium and at least one open chain dienyl ligand while forming a ruthenium-containing compound film thereon, purging the process chamber with a purge gas, exposing the ruthenium-containing compound film to a reducing gas comprising ammonia while forming a ruthenium layer on the low-k layer, and purging the process chamber with the purge gas, as recited in claim 44, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a low-k material disposed on a substrate surface, comprising positioning a substrate comprising a low-k layer disposed thereon within a process chamber, heating the substrate to a temperature within a range from about 200°C to about 400°C, exposing the low-k layer to bis(2,4-

dimethylpentadienyl) ruthenium to form a ruthenium-containing compound film thereon, purging the process chamber with a purge gas, exposing the ruthenium-containing compound film to a reducing gas comprising ammonia and atomic hydrogen while forming a ruthenium layer on the low-k layer, and purging the process chamber with the purge gas, as recited in claim 54, and claims dependent thereon.

Also, *Aaltonen* and *Kawano*, alone or in combination, do not teach, show, or suggest a method for forming a ruthenium material on a barrier material layer disposed on a substrate surface, comprising positioning a substrate comprising a tantalum-containing barrier layer disposed thereon within a process chamber, heating the substrate to a temperature within a range from about 200°C to about 400°C, exposing the tantalum-containing barrier layer to bis(2,4-dimethylpentadienyl) ruthenium while forming a ruthenium-containing compound film thereon, purging the process chamber with a purge gas, exposing the ruthenium-containing compound film to a reducing gas comprising ammonia and atomic hydrogen while forming a ruthenium layer on the tantalum-containing barrier layer, and purging the process chamber with the purge gas, as recited in claim 55, and claims dependent thereon.

Withdrawal of the rejection is respectfully requested by the Applicant.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the claimed invention.

Having addressed all issues set out in the Final Office Action, the Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

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